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Hsieh

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(54) **CABLE CLIP AND CABLE MANAGEMENT STRUCTURES FOR USE WITH AN OPTOELECTRONIC MODULE**

(71) Applicant: **FINISAR CORPORATION**, Sunnyvale, CA (US)

(72) Inventor: **Cindy H. Hsieh**, Los Altos, CA (US)

(73) Assignee: **FINISAR CORPORATION**, Sunnyvale, CA (US)

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G02B 6/42	(2006.01)
G02B 6/38	(2006.01)

(52) **U.S. Cl.**

CPC ***G02B 6/4292*** (2013.01); *G02B 6/3893* (2013.01); *G02B 6/3897* (2013.01); *G02B 6/4249* (2013.01); *G02B 6/4269* (2013.01)

(58) **Field of Classification Search**

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USPC 385/93; 174/255

See application file for complete search history.

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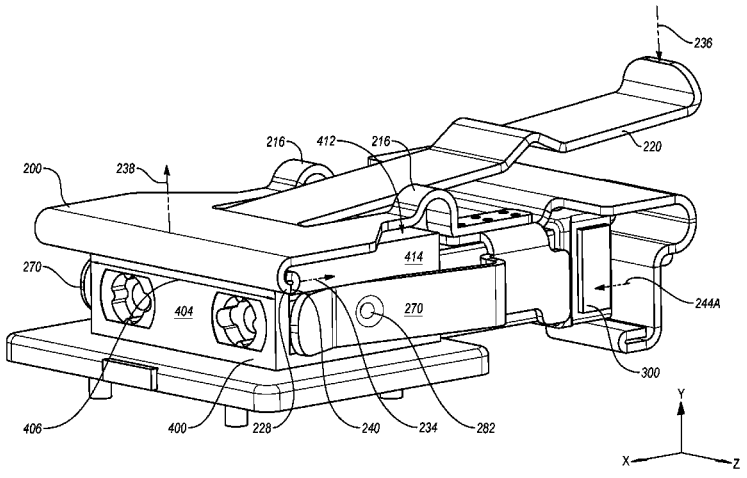
Primary Examiner — Peter Radkowski

(74) *Attorney, Agent, or Firm* — Maschoff Brennan

(57) **ABSTRACT**

An example embodiment includes a cable clip. The cable clip is configured to maintain engagement of an optical interface with a lens assembly included in an optoelectronic module. The cable clip includes a forward section, a clip body, a connector retention mechanism, a lens latch, and a release lever. The clip body is connected to the forward section at a clip shoulder. The connector retention mechanism is configured to retain the optical interface and extends from the clip body. The lens latch is positioned at a first end. The lens latch is configured to latch the lens assembly when a portion of the optical interface is received within the lens assembly. The release lever is connected to the forward section. The release lever is configured to unlatch the lens latch from the lens assembly in response to application of an actuation force above a particular threshold magnitude.

19 Claims, 15 Drawing Sheets



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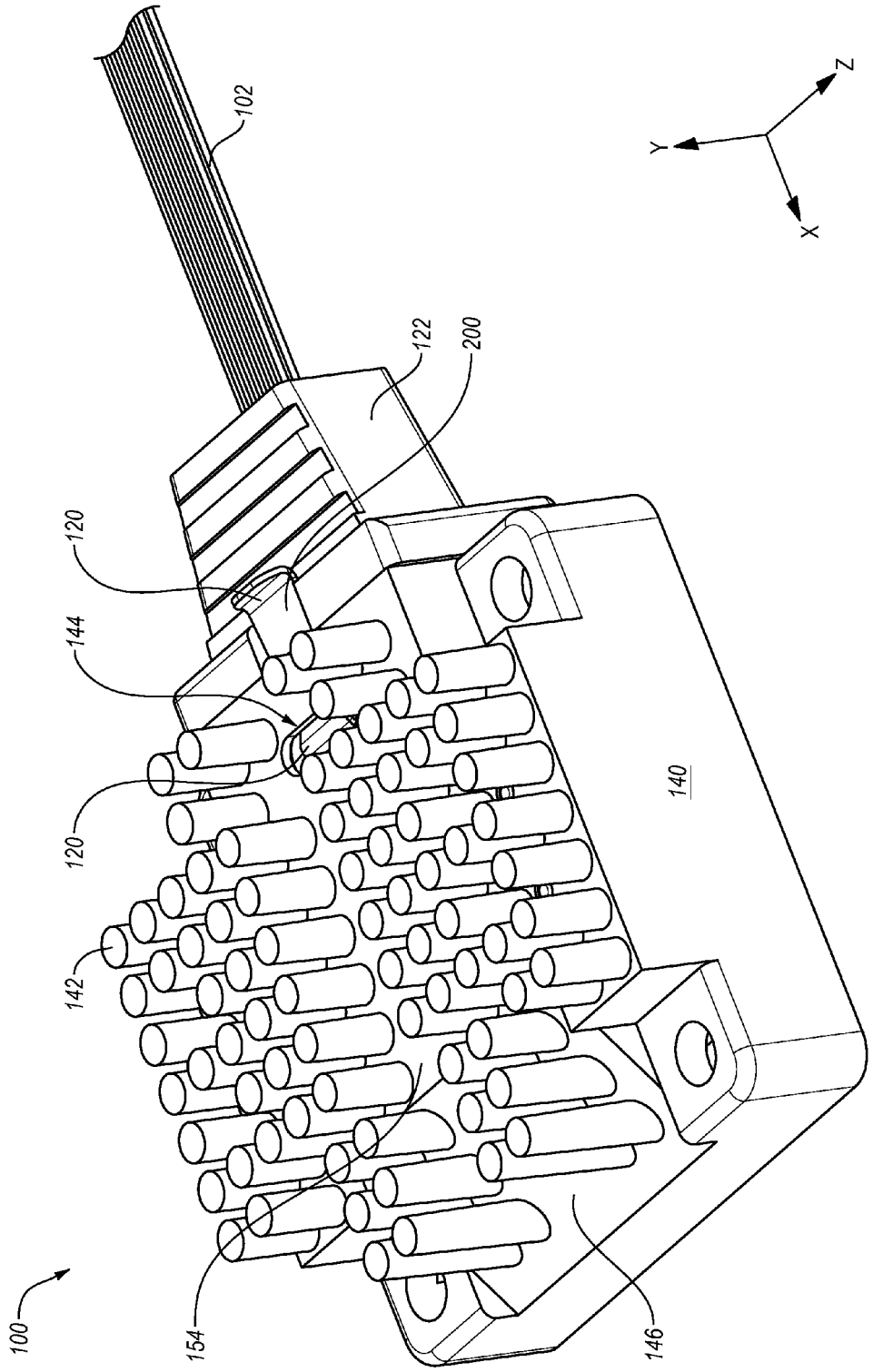
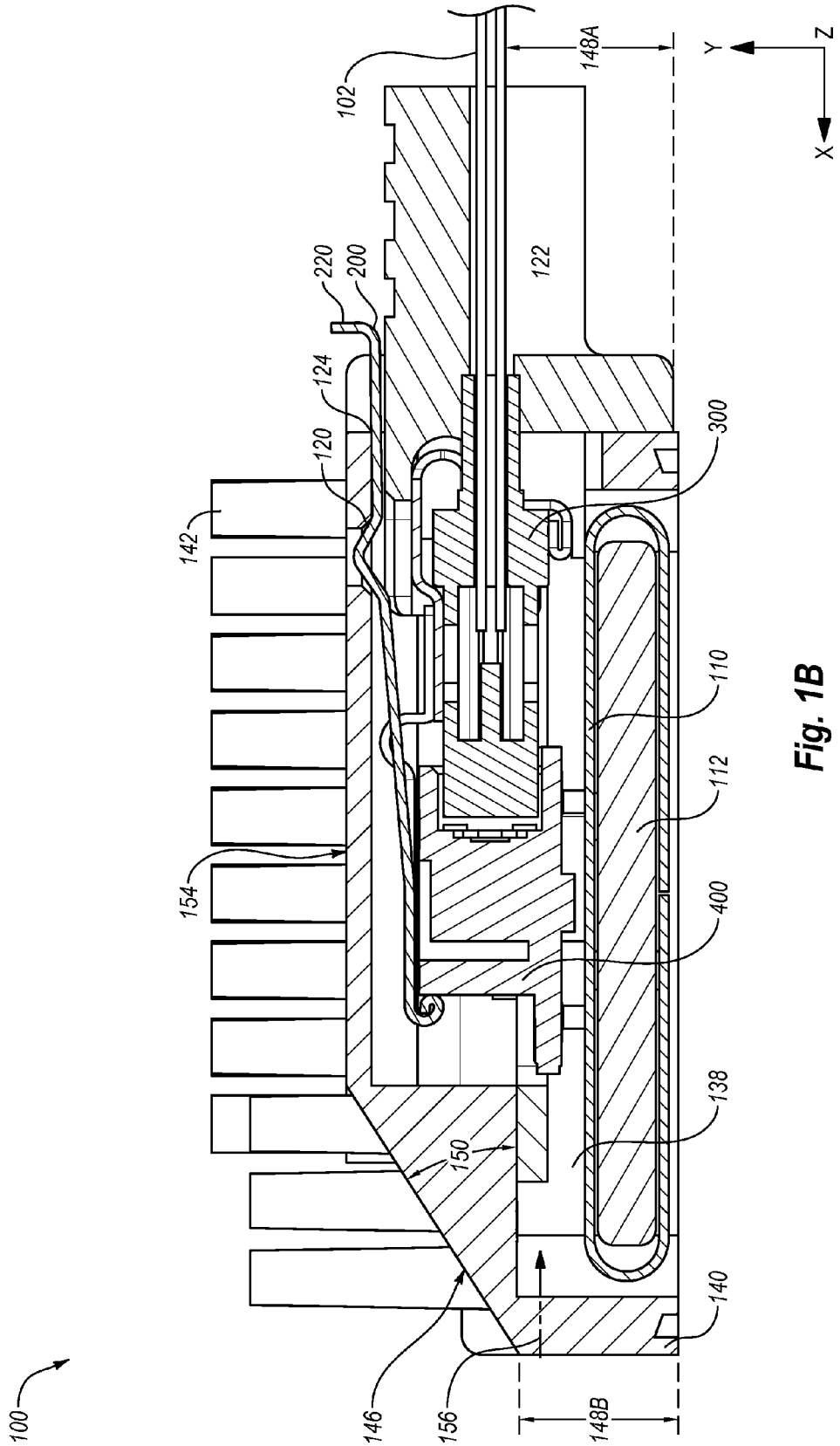


Fig. 1A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102
148A
Y
Z
X
220
200
122
124
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300
142
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112
154
400
138
150
140
146
156
148B

Fig. 1B

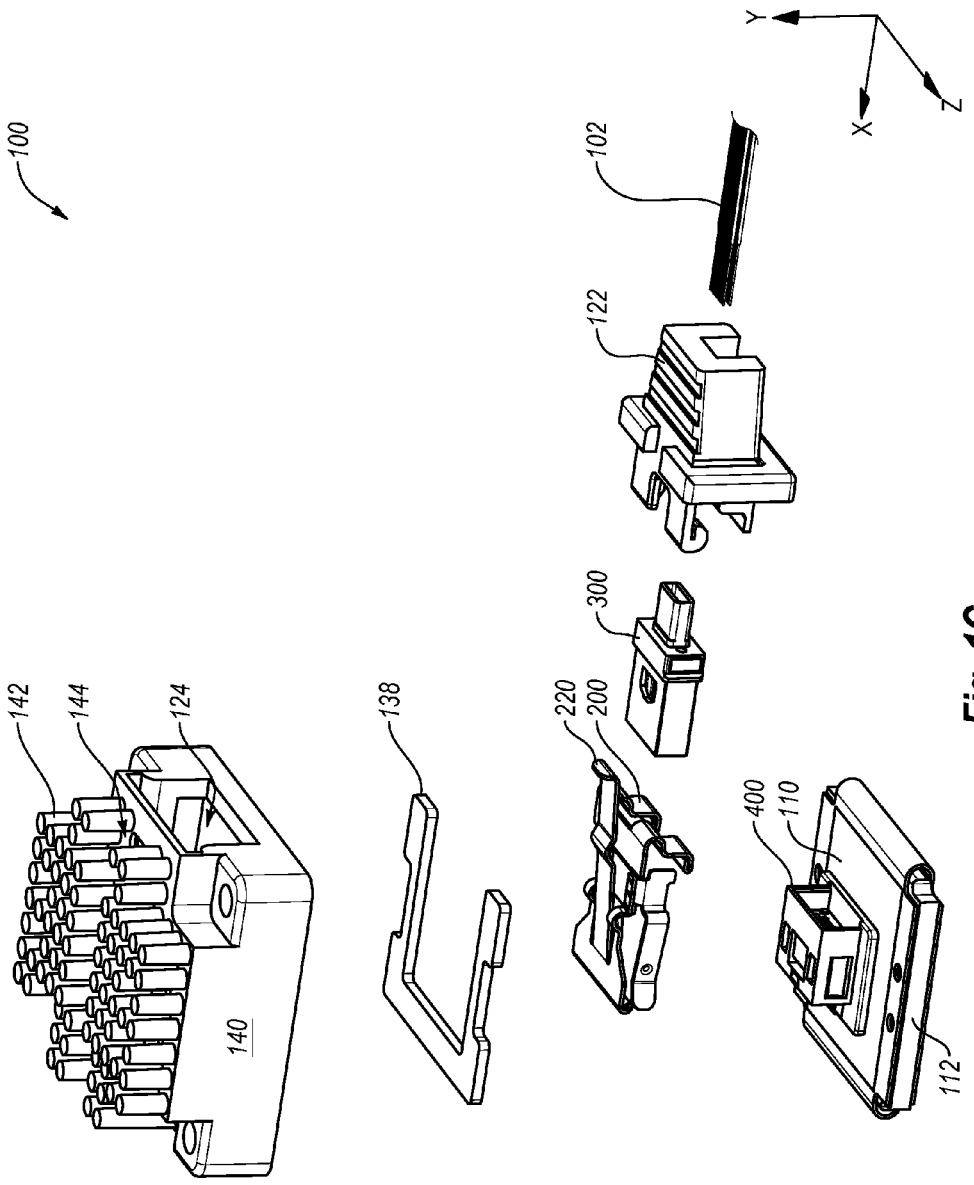


Fig. 1C

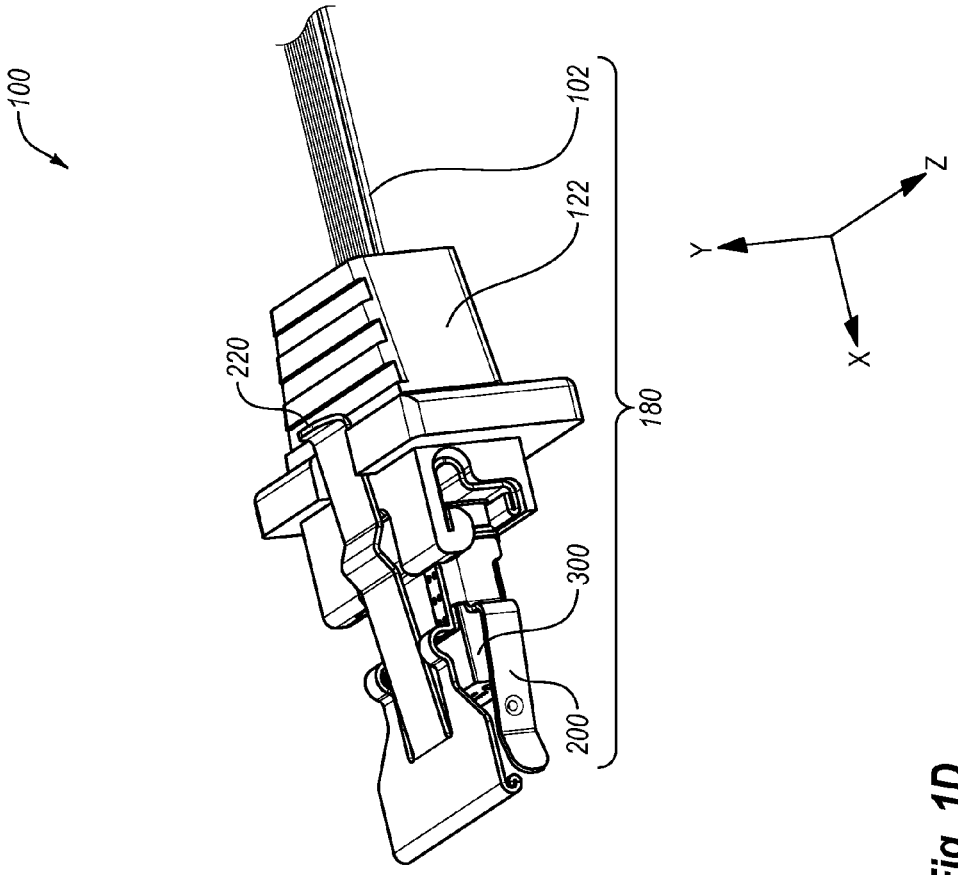
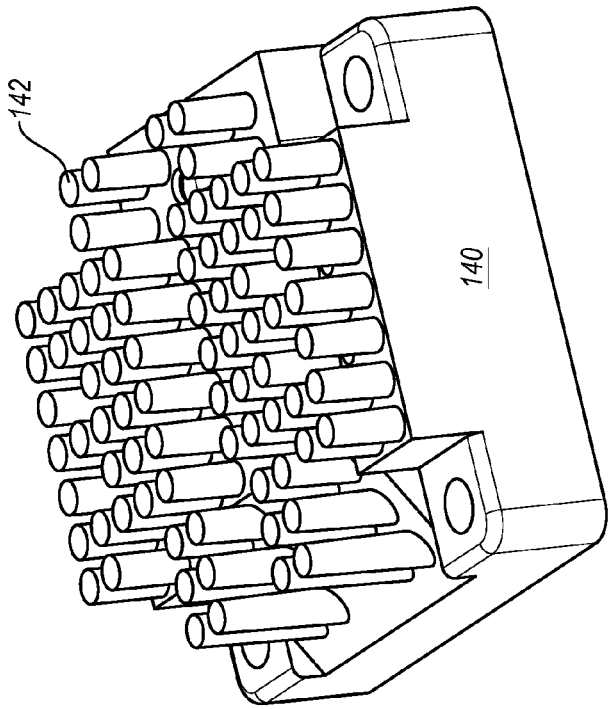
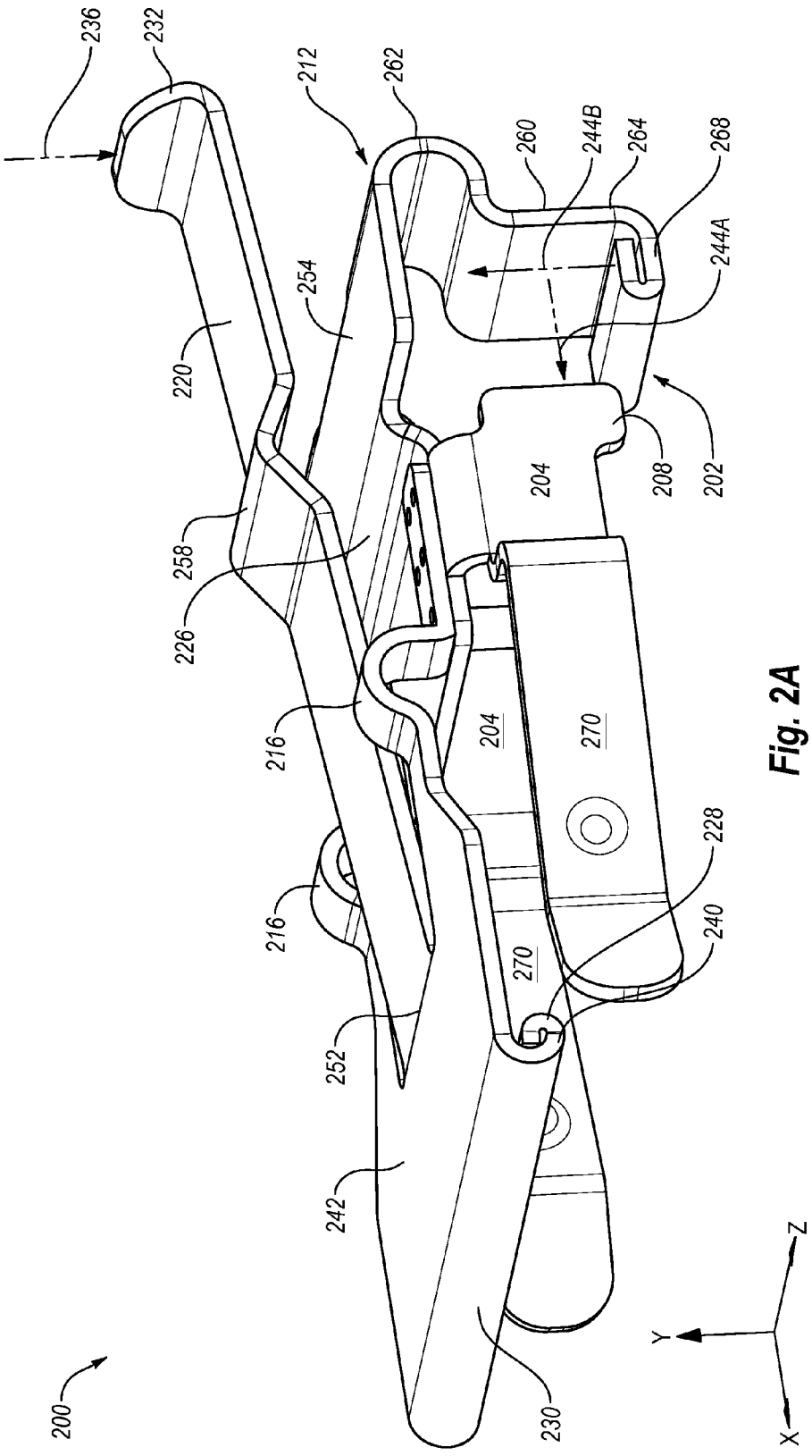


Fig. 1D

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262
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244B
264
268
254
244A
220
202
208
204
258
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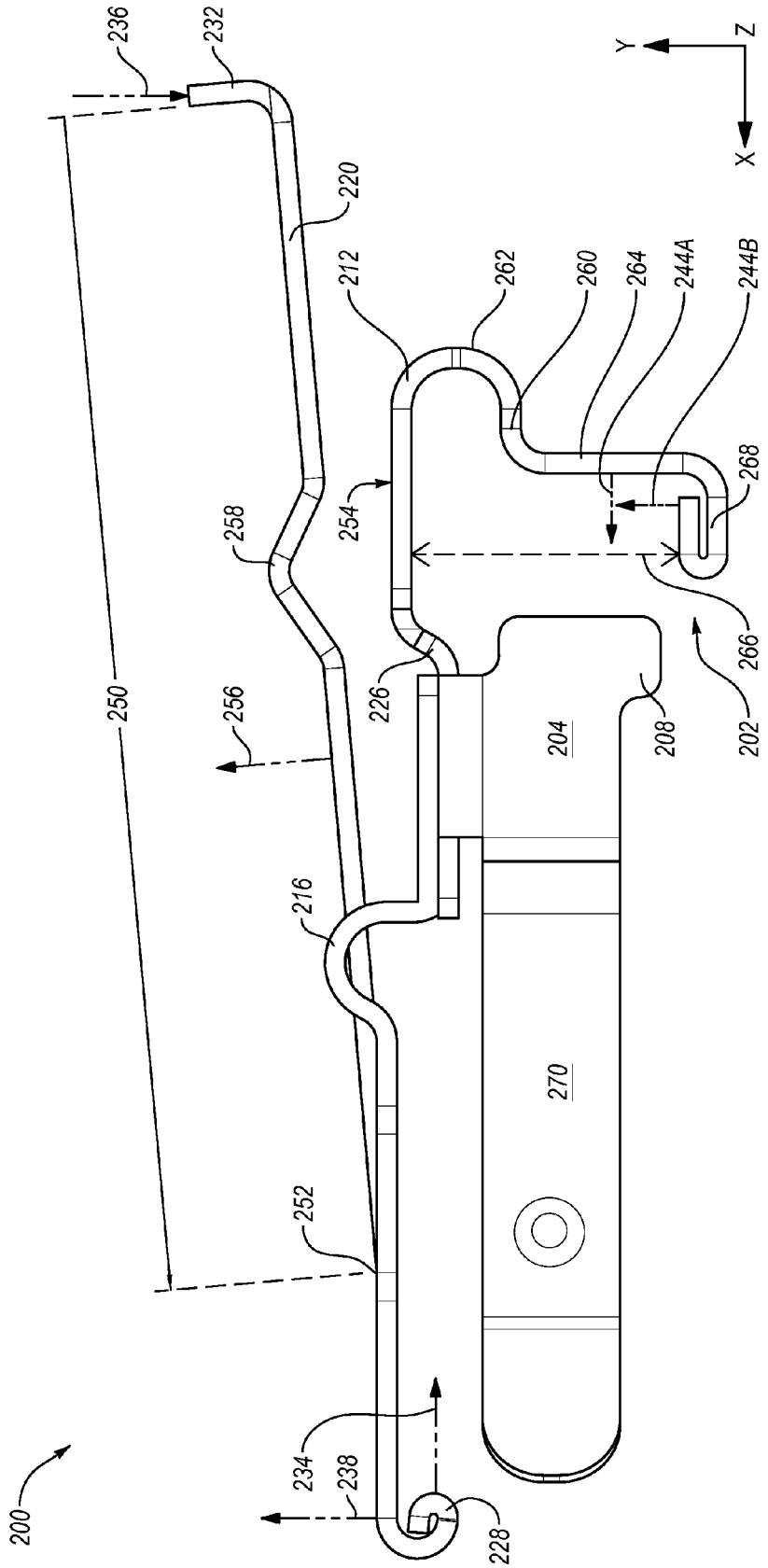
216
204
270
228
216
240
270
252
242
230
200
Z
Y
X

Fig. 2A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244B
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252
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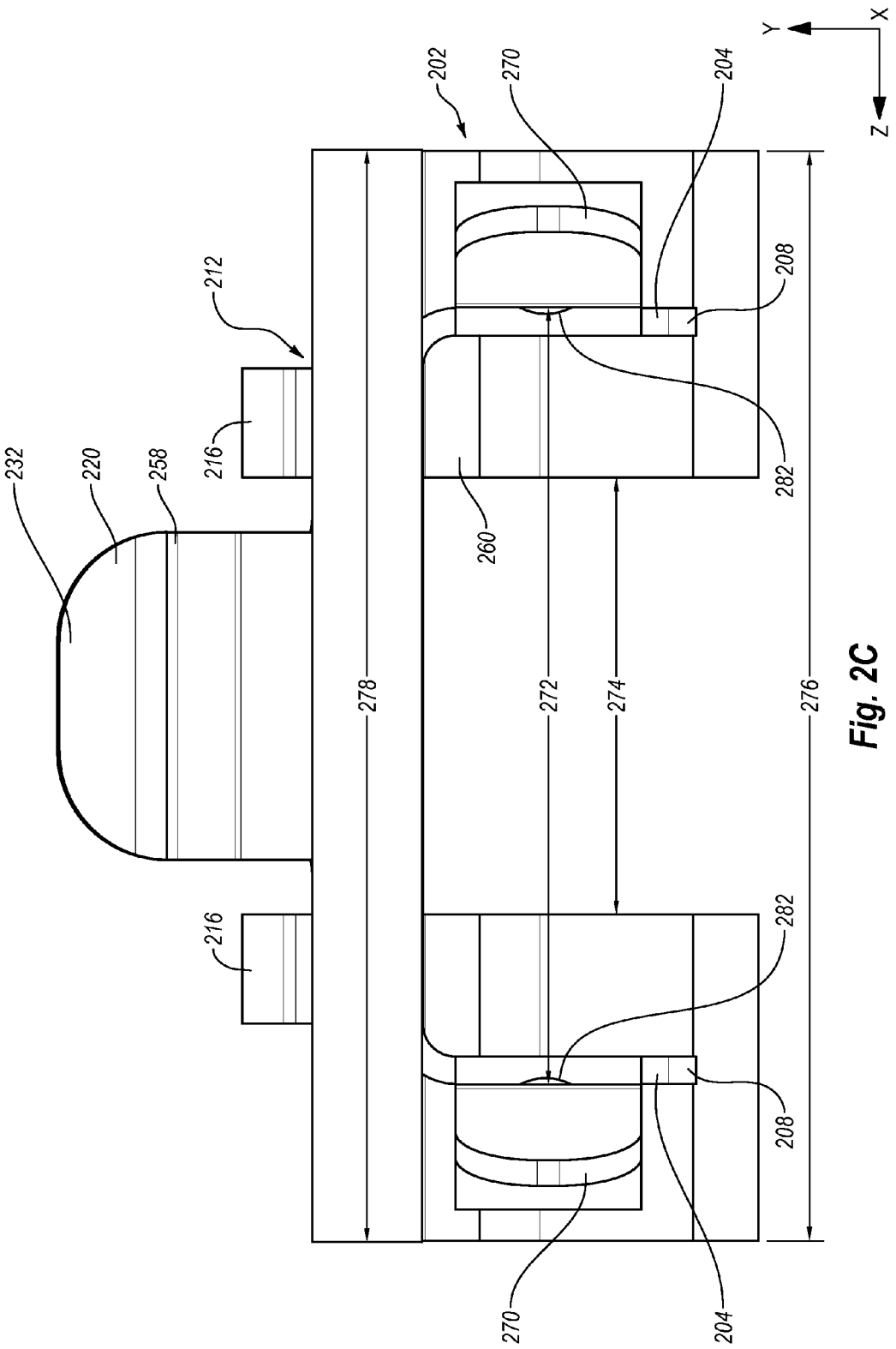
228
200
Y
Z
X

Fig. 2B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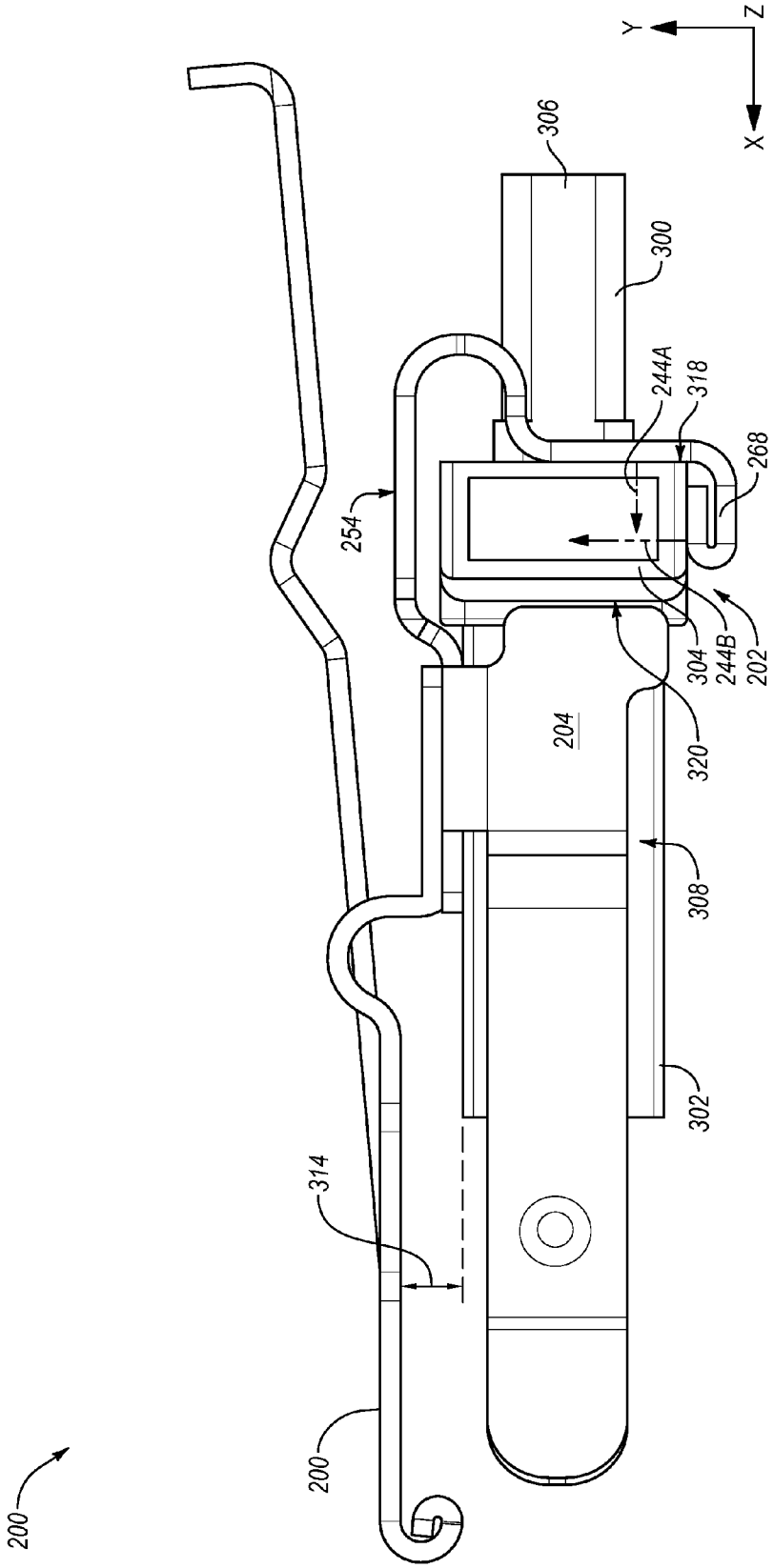
208
270
204

Fig. 2C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244A
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268
254
304
244B
202
320
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308
302
314
200
200

Fig. 3A

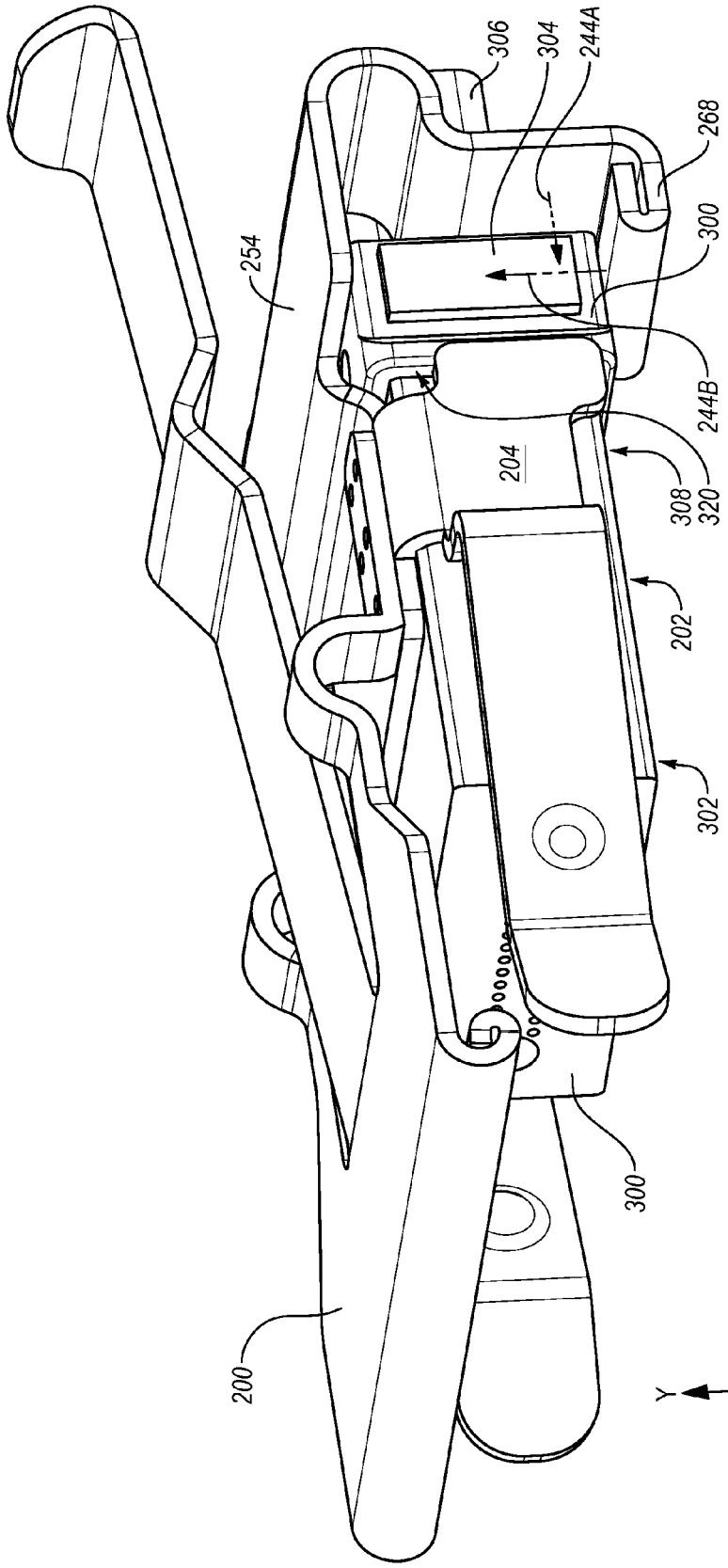
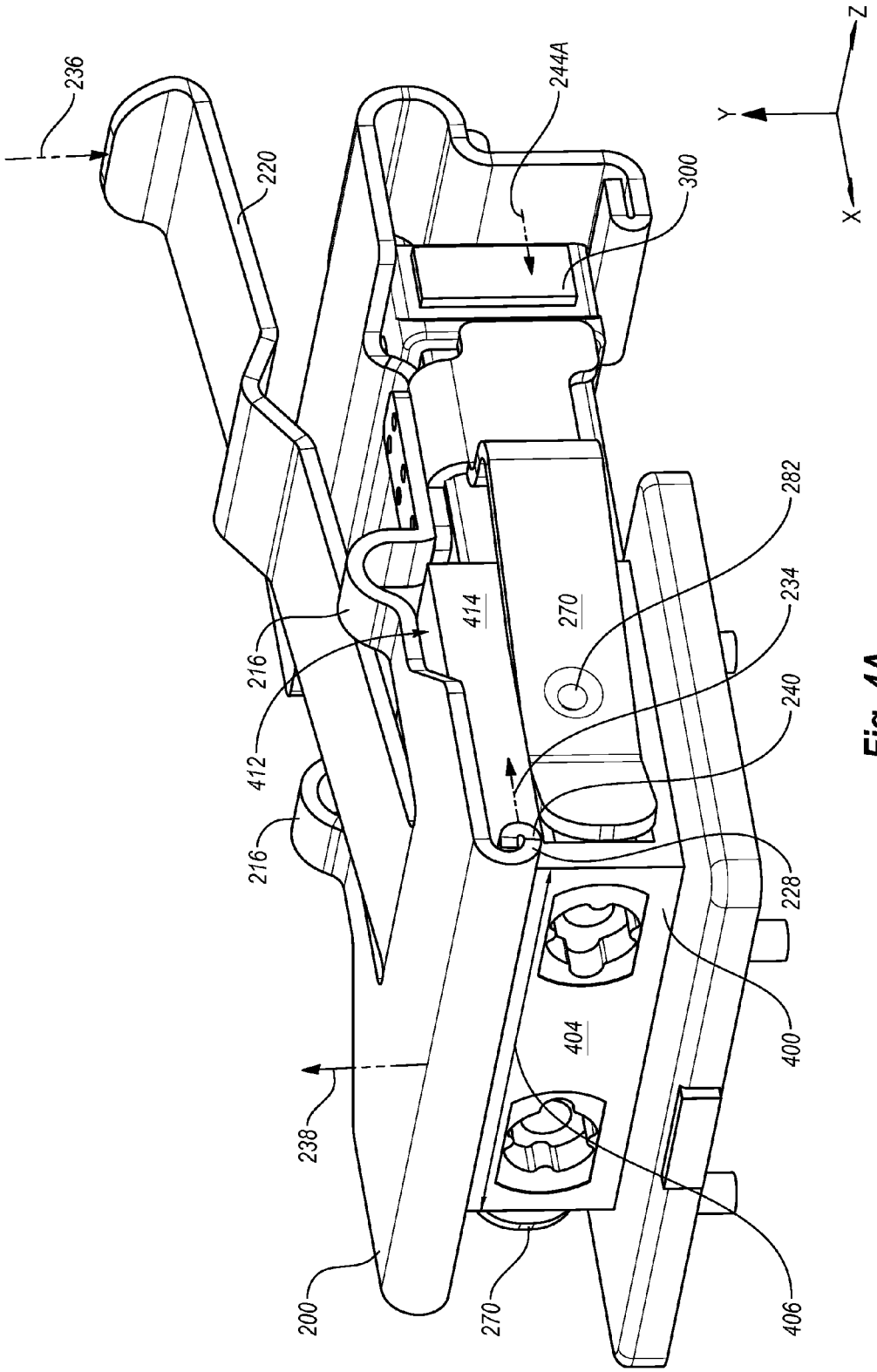


Fig. 3B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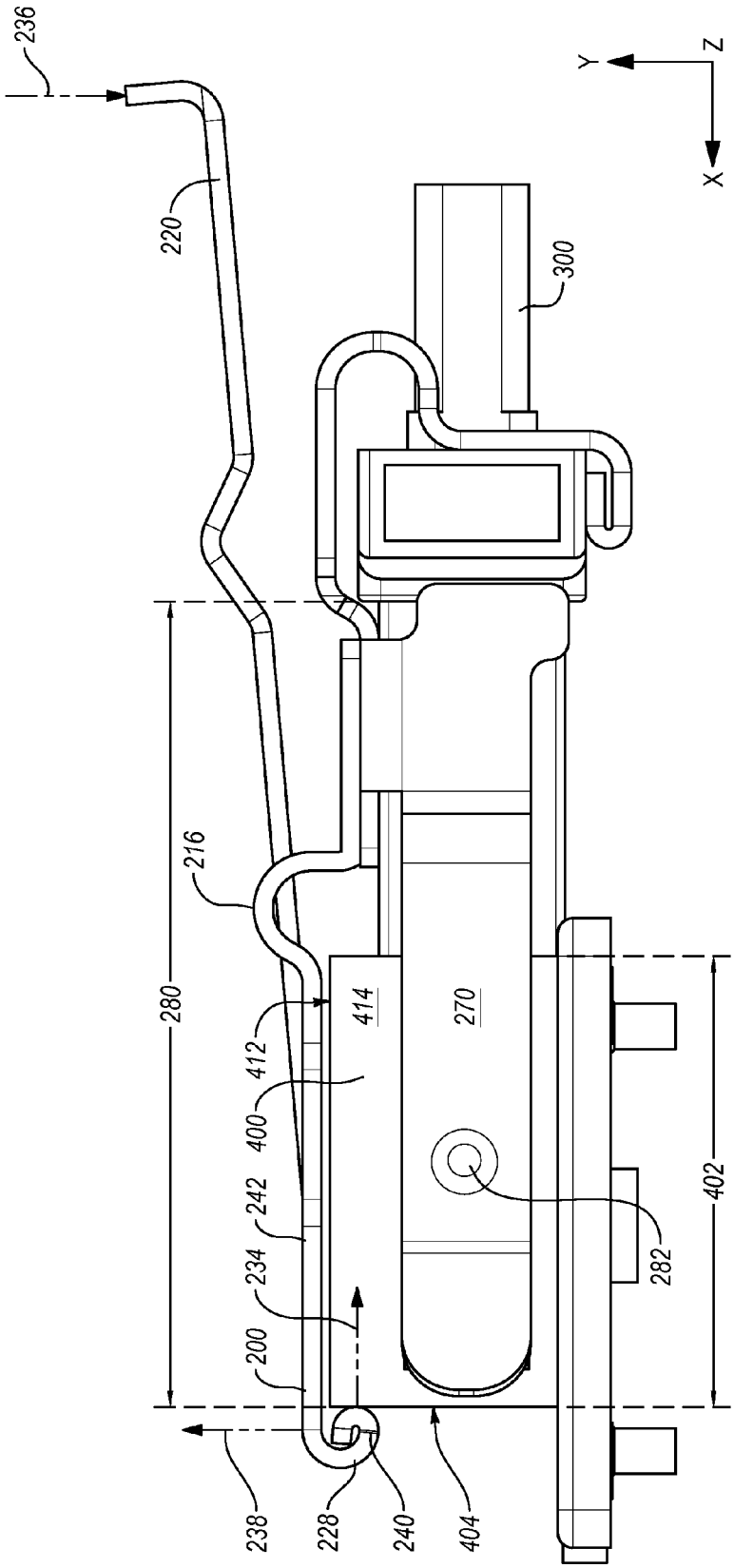
220
244A
300
Z
Y
X
282
234
240
228
414
270
216
412
216
400
404
238
200
270
406

Fig. 4A


236
220
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Z
X
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280
414
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412
400
242
234
200
402
282
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228
240
404

Fig. 4B

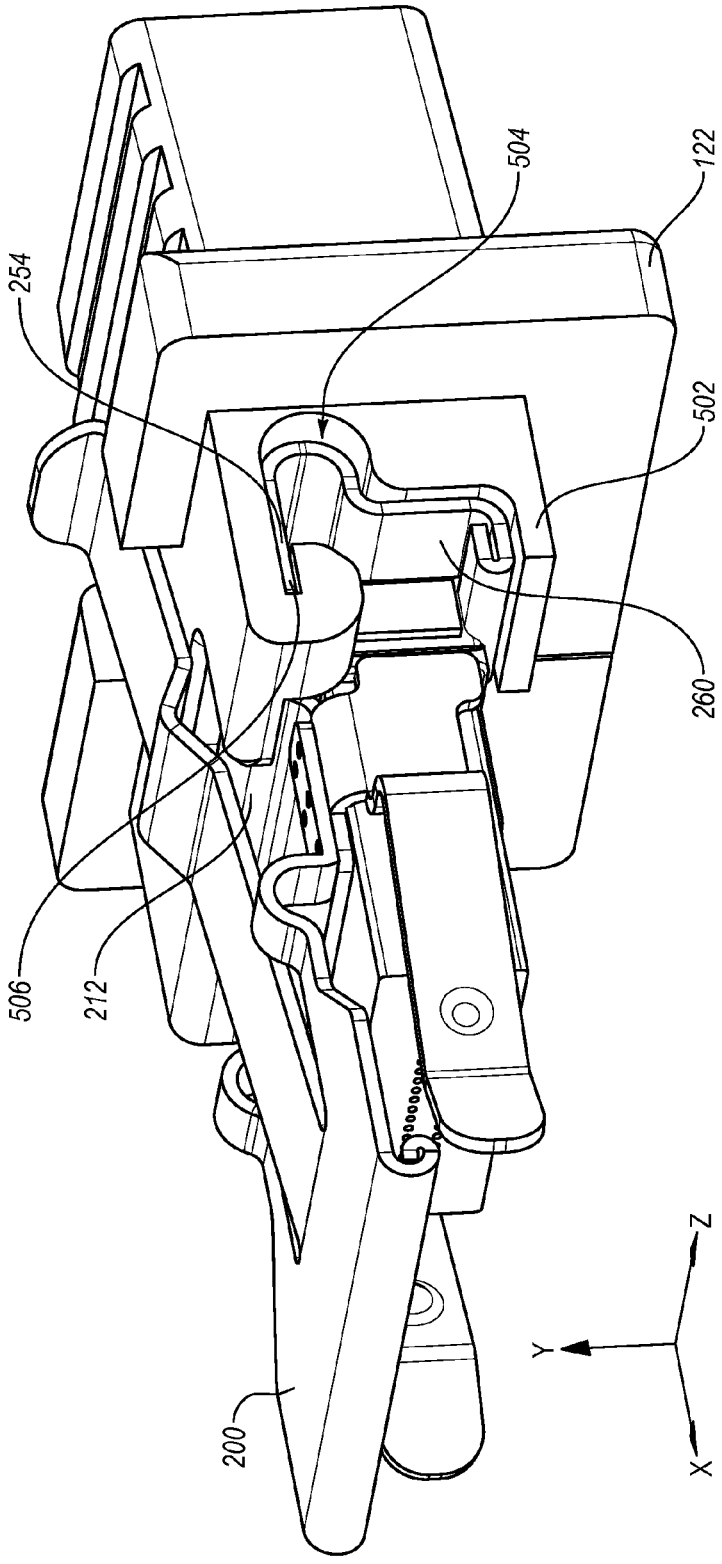

Fig. 5A

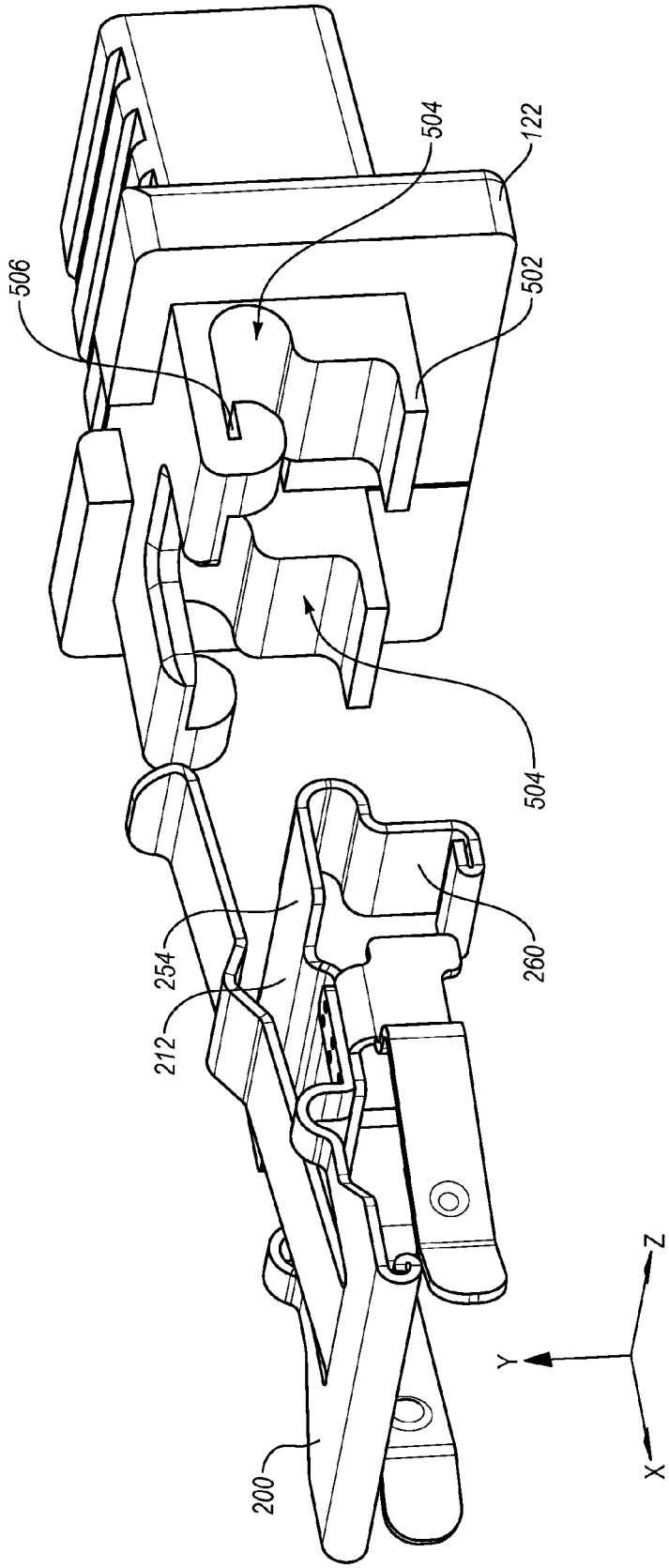

Fig. 5B

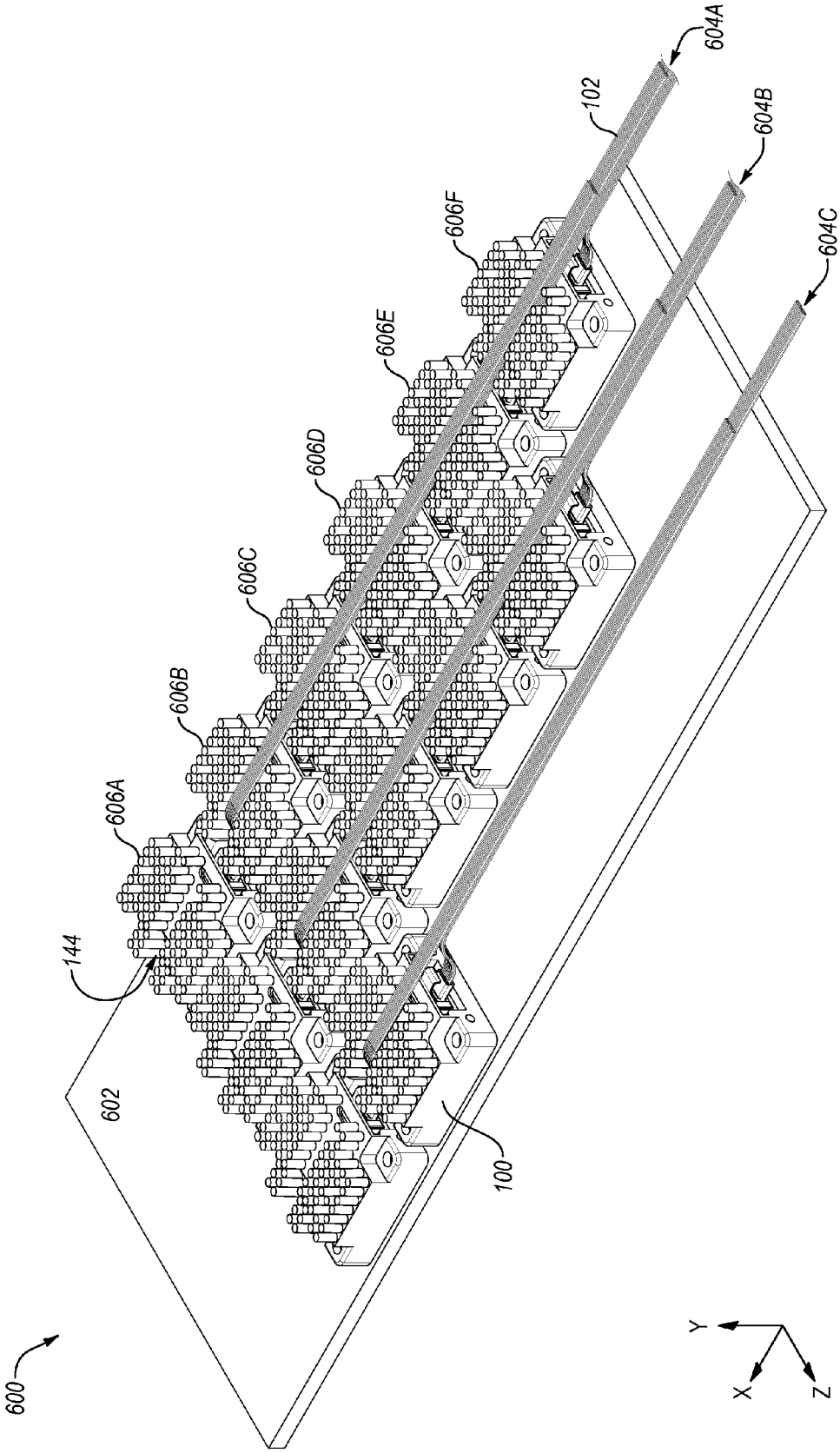
600
602
144
606A
606B
606C
606D
606E
606F
102
604A
604B
604C
100
Y
X
Z

Fig. 6A

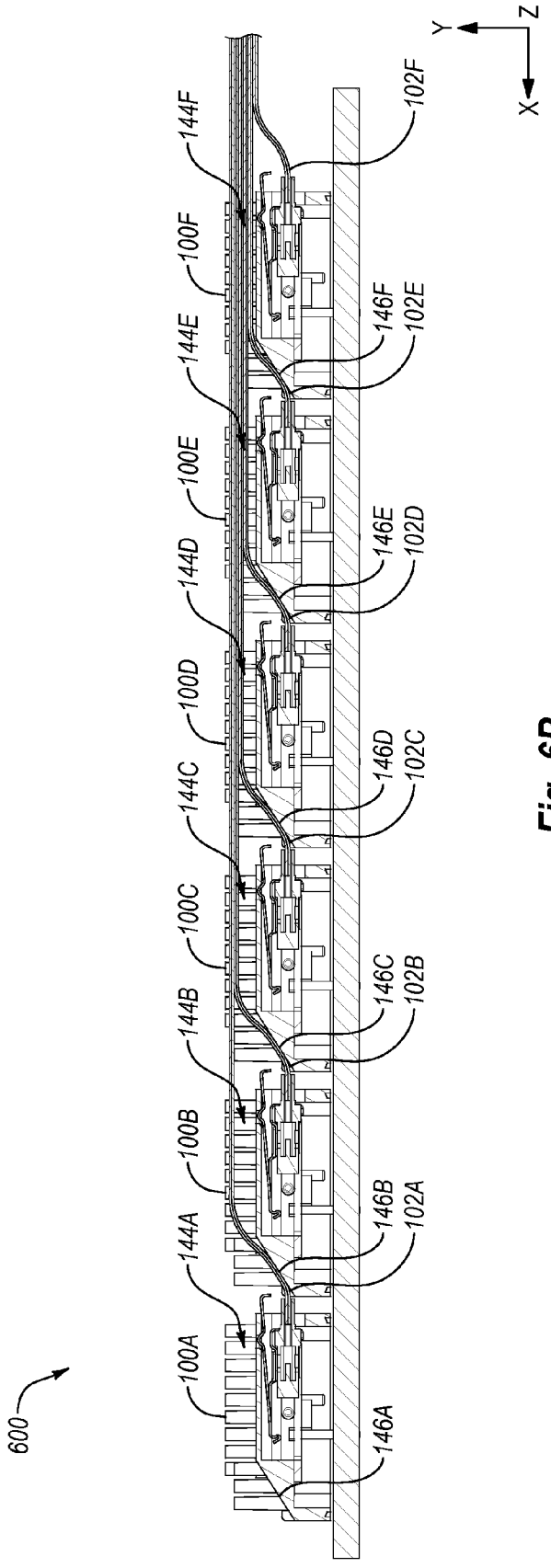
Y
Z
X
600
100A
144A
146A
102A
100B
144B
146B
102B
100C
144C
146C
102C
100D
144D
146D
102D
100E
144E
146E
102E
100F
144F
146F
102F

Fig. 6B

CABLE CLIP AND CABLE MANAGEMENT STRUCTURES FOR USE WITH AN OPTOELECTRONIC MODULE

CROSS-REFERENCE TO RELATED APPLICATIONS

This patent application claims the benefit of and priority to U.S. Provisional Patent Application Nos. 61/817,230 filed Apr. 29, 2013 and 61/902,067 filed Nov. 8, 2013, which are incorporated herein by reference in their entireties.

FIELD

Embodiments disclosed herein relate to optical components. In particular, some embodiments described herein relate to cable clips and cable management structures that may be used with optoelectronic modules.

BACKGROUND

Some data transmission involves the conversion of optical signals to electrical signals and/or electrical signals to optical signals. In some applications, the conversion occurs at a circuit board. For example, an optical cable carrying one or more optical signals may interface with an optoelectronic module such as a board-mounted optical engine. At the optical engine, the optical signals may be transduced from optical signals to electrical signals using optical receivers. The electrical signals may then be communicated along etched copper traces integrated into the circuit board to a destination. Likewise, electrical signals may be communicated along copper traces to the board-mounted optical engine. At the board-mounted optical engine, the electrical signals may be transduced to optical signals by optical transmitters. The optical signals may then be further communicated along the same or a different optical cable that interfaces with the optoelectronic module.

In some board-mounted optical engines, a lens assembly may be configured to receive an optical interface such as a pluggable cable connector. The optical interface generally supports one or more optical cables that communicate the optical data to and from the board-mounted optical engine. When received in the lens assembly, alignment of the optical interface with respect to the lens assembly and retention of the optical interface within the lens assembly may help ensure proper communication of the optical data. However, due to mechanical loads applied to the optical cables and/or the pluggable cable connector, the optical interface may be inadvertently disengaged from the lens assembly or misalignment may occur between the optical interface and the lens assembly.

The subject matter claimed herein is not limited to embodiments that solve any disadvantages or that operate only in environments such as those described above. Rather, this background is only provided to illustrate one exemplary technology area where some embodiments described herein may be practiced.

SUMMARY

An example embodiment includes a cable clip. The cable clip is configured to maintain engagement of an optical interface with a lens assembly included in an optoelectronic module. The cable clip includes a forward section, a clip body, a connector retention mechanism, a lens latch, and a release lever. The clip body is connected to the forward section at a clip shoulder. The connector retention mechanism is configured to retain the optical interface and extends from the clip body. The lens latch is positioned at a first end. The lens latch is configured to latch the lens assembly when a portion of the optical interface is received within the lens assembly. The release lever is connected to the forward section. The release lever is configured to unlatch the lens latch from the lens assembly in response to application of an actuation force above a particular threshold magnitude.

Another example embodiment includes connector assembly. The connector assembly is configured to be at least partially positioned within a module housing of an optoelectronic module. The connector assembly includes a cable clip and a dust seal. The cable clip is configured to maintain engagement between an optical interface and a lens assembly when the cable clip is latched and to allow disengagement of the connector from the lens assembly when the cable clip is unlatched. The cable clip includes a release lever that is sized in relation to the module housing such that when the connector is received in the lens assembly, a portion of the release lever protrudes from the module housing. The release lever is configured to unlatch the cable clip in response to application of an actuation force to the portion of the release lever that protrudes from the module housing. The dust seal is configured to at least partially surround the connector and the cable clip. The dust seal is sized to substantially fill a space between the connector and a module opening through which the connector assembly is introduced into the module housing.

Another example embodiment includes a cable clip. The cable clip is configured to maintain engagement between a mechanical transfer (MT) connector having twenty-four optical channels configured to communicate twenty-four channels of data and a lens assembly included in an optoelectronic module configured to communicate data at 25 gigabits per second (G) or higher. The cable clip includes a clip body, a connector retention mechanism, a forward section, a lens latch, and a release lever. The connector retention mechanism is configured to retain the MT connector and extends from the clip body. The forward section is attached to the clip body by clip shoulders. The lens latch is positioned at a first end of the forward section. The lens latch is configured to apply a latching force to a front surface of the lens assembly when the MT connector is received within the lens assembly. The release lever extends from the front portion and is sized to partially protrude from a module housing. The release lever is configured to rotate the forward section in response to the application of an actuation force to the release lever.

The object and advantages of the embodiments will be realized and achieved at least by the elements, features, and combinations particularly pointed out in the claims.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are not restrictive of the invention, as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

Example embodiments will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

FIGS. **1**A-**1**D illustrate an example optoelectronic module;

FIGS. **2**A-**2**C illustrate an example cable clip (clip) that may be implemented in the optoelectronic module of FIGS. **1**A-**1**D;

FIGS. **3**A and **3**B illustrate the clip of FIGS. **2**A-**2**C retaining an example connector;

FIGS. **4**A and **4**B illustrate the clip retaining the connector engaged with an example lens assembly;

FIGS. **5**A and **5**B illustrate the clip with an example dust seal; and

FIGS. **6**A and **6**B illustrate an example multiple module implementation.

DESCRIPTION OF SOME EXAMPLE EMBODIMENTS

Embodiments disclosed herein relate to optical components. More particularly, some example embodiments relate to cable clips that may be used in optoelectronic modules and some additional structural features that may be included in the optoelectronic modules.

An example embodiment includes a cable clip (clip) that is configured to maintain engagement of a connector with a lens assembly of an optical engine. The clip may also enable the connector to be disengaged from the lens assembly without disassembling the optical engine. The clip includes a forward section, a connector retention mechanism, a lens latch, and a release lever. The connector retention mechanism is configured to retain the connector in a position that enables the connector to be received by the lens assembly. The lens latch is positioned at a first end of the forward section. The lens latch latches the connector to the lens assembly when the connector is received within the lens assembly. The release lever is connected to the forward section and a portion of the release lever protrudes from a module housing of the optical engine. The release lever is configured to unlatch the lens latch from the lens assembly in response to application of an actuation force above a particular threshold magnitude to the portion of the release lever that protrudes from the module housing. The application of the actuation force results in a rotation and displacement of the forward section that unlatches the lens latch.

Reference will now be made to the drawings to describe various aspects of some embodiments. It is to be understood that the drawings are diagrammatic and schematic representations of the embodiments, and are not meant to be limiting, nor are they necessarily drawn to scale. Throughout the drawings, like numbers generally reference like structures unless described otherwise.

FIGS. **1**A-**1**D illustrate an example optoelectronic module **100**. Specifically, FIG. **1**A depicts an external view of the optoelectronic module **100**. FIG. **1**B depicts a sectional view of the optoelectronic module **100**. FIG. **1**C depicts a partially exploded view of the optoelectronic module **100**. FIG. **1**D depicts another partially exploded view of the optoelectronic module **100**. The optoelectronic module **100** depicted in FIGS. **1**A-**1**D includes an optical engine. An example of the optoelectronic module **100** may be designed for high-speed (e.g., 25 gigabits per second (G) or higher) optical interconnects between integrated circuits and/or between circuit boards. Additionally or alternatively, the optoelectronic module **100** may be configured to receive twenty-four optical channels, each of which may be configured to communicate data.

The optoelectronic module **100** may be mounted to a circuit board (not shown) of a host device and may be configured to communicate data between the host device and a network (not shown), for example. The optoelectronic module **100** may convert electrical signals to optical signals representing the electrical signals and vice versa. For example, data in the form of optical signals may be communicated from a network along optical cables **102** to the optoelectronic module **100**. Components (examples of which are described below) of the optoelectronic module **100** may convert the optical signals to electrical signals representative of the optical signals. The electrical signals may then be communicated to the host device. Likewise, the host device may communicate electrical signals to the optoelectronic module **100**. The optoelectronic module **100** may convert the electrical signals to optical signals representative of the electrical signals. The optical signals may be communicated along the optical cables **102** into the network to, e.g., another optoelectronic module.

The optoelectronic module **100** may include a module housing **140**. The module housing **140** may generally protect components positioned within the module housing **140**. Additionally, the module housing **140** may dissipate heat. In the depicted optoelectronic module **100**, for example, the module housing **140** may include one or more heat dissipating structures **142** configured to dissipate heat from the optoelectronic module **100**. Only one of the heat dissipating structures **142** is labeled in FIGS. **1**A-**1**D. In some embodiments, one or more heat dissipating structures may be removably attached to the module housing **140**. Additionally or alternatively, the heat dissipating structures **142** may be omitted.

The module housing **140** may also include a cable path **144** (FIGS. **1**A and **1**C only) defined between one or more of the heat dissipating structures **142**. One or more optical cables (e.g., **102**) of other optoelectronic modules positioned adjacent to the optoelectronic module **100** may be positioned in the cable path **144**. Positioning the optical cables in the cable path **144** may help to prevent or reduce the likelihood that the optical cables become tangled or damaged. In some embodiments, up to six or more optical cables, each from other optoelectronic modules, may be positioned in the cable path **144**. Some additional details of an implementation including multiple optoelectronic modules are discussed with reference to FIGS. **6**A and **6**B.

In some embodiments, the cable path **144** may include a sloped section **146** (FIGS. **1**A and **1**B only). As best illustrated in FIG. **1**B, the optical cable **102** may exit the optoelectronic module **100** at an exit height **148**A. The exit height **148**A may generally correspond to an entry height **148**B at which an optical cable of one or more other optoelectronic modules may enter the cable path **144**. The sloped section **146** may then gradually increase in height until the sloped section **146** intercepts a top **154** (FIGS. **1**A and **1**B only) of the module housing **140**.

A sloped section angle (angle) **150** (FIG. **1**B only) may be defined between an outer surface of the sloped section **146** and a horizontal reference plane **156** (FIG. **1**B only). The angle **150** and/or a separation between the optoelectronic module **100** and an adjacent optoelectronic module may be configured to prevent an excess bending applied to one or more optical cables. For example, the angle **150** and/or the separation may ensure that a maximum acceptable bend radius of the one or more optical cables that exit the adjacent optoelectronic module and that enter the cable path **144** at the sloped section **146** is not exceeded.

In particular, as shown in FIG. **1**B, the optical cable **102** may exit the optoelectronic module **100** at a relatively horizontal or 0-degree angle. The optical cable **102** may be redirected upward (e.g., an arbitrarily defined positive y-direction included in an arbitrarily defined X-Y-Z Cartesian coordinate system) by a sloped section (e.g., the sloped section **146**) of an adjacent optical module, which may be substantially similar to the optoelectronic module **100**. The angle **150** of the adjacent optical module may accordingly support the optical cable **102** such that the optical cable **102** may not exceed an acceptable bend radius. Reducing the likelihood that the bend radius is exceeded may reduce a likelihood that the optical

cable **102** is damaged. The angle **150** may be based on the type of optical fiber included in the optical cable **102** and/or a number of optical cables (e.g., **102**) or optical fibers that may be positioned in the cable path **144**.

With reference to FIGS. **1**B and **1**C, a lens assembly **400**, a printed circuit board (PCB) **110**, a heat sink **138**, and a module board **112** may be positioned within the module housing **140**. The lens assembly **400** may be positioned above one or more components (not shown) mounted to the PCB **110**. The heat sink **138** may be configured to transfer heat from the one or more components mounted to the PCB **110** to the module housing **140**.

The lens assembly **400** may be configured to receive a connector **300**. The optical cables **102** may be optically coupled to the connector **300** such that optical signals may be communicated between the optical cables **102** and the connector **300**. The connector **300** may be optically coupled with the optical cables **102** and may be an interface at which optical signals may be further communicated. For example, the optical signals may be communicated from the optical cables **102** to the connector **300** and then to the lens assembly **400**. When received in the lens assembly **400**, the optical signals may be communicated by the lens assembly **400** to the one or more components mounted to the PCB **110**. As used herein, the term "optical interface" may be used to describe the connector **300** and similar and/or analogous structures that provide an interface with optical signals carried over the optical cables **102**. In the depicted optoelectronic module **100**, the optical cables **102** may include ribbon optical fibers, for example. Additionally or alternatively, the connector **300** may include a pluggable mechanical transfer (MT) connector.

With reference to FIGS. **1**B-**1**D, engagement and alignment between the connector **300** and the lens assembly **400** may be maintained by a cable clip (clip) **200**. Specifically, the clip **200** may retain the connector **300**. When the connector **300** is received in the lens assembly **400**, the clip **200** may latch to the lens assembly **400** and/or the module housing **140** as described in more detail herein.

As best illustrated in FIG. **1**D, the clip **200** may be included with a dust seal **122** and the connector **300** to form a connector assembly **180** (FIG. **1**D only). The dust seal **122** may be configured to partially surround the connector **300** and the clip **200**. The dust seal **122** may reduce introduction of dust or similar unwanted materials into the module housing **140** when the connector **300** is received in the lens assembly **400**. Specifically, the dust seal **122** may be shaped to correspond to a module opening **124** (FIGS. **1**B and **1**C only) and to partially surround a portion of the connector **300**. When the connector **300** is received by the lens assembly **400** and/or generally positioned in the module opening **124**, the dust seal **122** may substantially fill a space between the connector **300** and the module opening **124**, thereby preventing or substantially preventing the ingress of dust and/or other particles.

Referring to FIGS. **1**A-**1**D, the connector assembly **180** may be introduced into the module housing **140** through the module opening **124**. FIG. **1**D depicts the connector assembly **180** external to the module housing **140**. FIGS. **1**A and **1**B depict the connector assembly **180** positioned within the module housing **140**.

The lens assembly **400** may be positioned within the module housing **140**. In some embodiments, the lens assembly **400** may be mounted to the module board **112**. The connector assembly **180** may be introduced through the module opening **124** such that the lens assembly **400** receives the connector **300**.

As best shown in FIGS. **1**B and **1**C, when the connector **300** is received in the lens assembly **400**, a release lever **220**, or some portion thereof, may extend past (e.g., farther in an arbitrarily defined negative x-direction) the module housing **140**. By protruding from the module housing **140**, the release lever **220** may enable application of an actuation force **236** (FIG. **1**B only) to the release lever **220** without removal or disassembly of the module housing **140**. The actuation force **236** may enable disengagement of the connector **300** from the lens assembly **400** and may enable disengagement of the clip **200** from the module housing **140**. When the connector **300** is disengaged from the lens assembly **400** and the clip **200** is disengaged from the module housing **140**, the connector assembly **180** may be removed from the module housing **140**. Thus, the clip **200** secures the connector **300** to the lens assembly **400**, maintains engagement between the connector **300** and the lens assembly **400**, and enables disengagement of the clip **200** from the module housing **140** and the connector **300** from the lens assembly **400** without removal or disassembly of the optoelectronic module **100**.

FIGS. **2**A-**2**C illustrate an example embodiment of the clip **200**. The clip **200** may be implemented as the clip **200** in the optoelectronic module **100** of FIGS. **1**A-**1**D. FIG. **2**A depicts a perspective view of the clip **200**. FIG. **2**B depicts a side view of the clip **200**. FIG. **2**C depicts a front view of the clip **200**. The clip **200** may be configured to maintain engagement between an optical interface and a lens assembly. Additionally, a user may unlatch the clip **200**, which may allow disengagement of the optical interface from the lens assembly without disassembling an optoelectronic module including the optical interface and the lens assembly. For example, with combined reference to FIGS. **1**A-**1**D and **2**A-**2**C, the clip **200** may be configured to maintain engagement between the connector **300** and the lens assembly **400**, which may be positioned within the module housing **140**. A user may unlatch the clip **200** from the lens assembly **400**, which may disengage the connector **300** from the lens assembly **400**. The user may then withdraw the connector **300** and the clip **200** from the module housing **140**.

With reference to FIGS. **2**A-**5**B, an example embodiment of the clip **200** will be described in the context of FIGS. **1**A-**1**D, which may include reference to the connector **300**, the lens assembly **400**, and the optoelectronic module **100**. However, embodiments of the clip **200** may be used with other optical interfaces such as other pluggable MT connectors and/or with other optoelectronic modules.

Referring to FIGS. **2**A-**2**C, the clip **200** may include a connector retention mechanism **202**. The connector retention mechanism **202** may be configured to retain the optical interface. The connector retention mechanism **202** may generally support and maintain a position of the optical interface with respect to the clip **200**.

In some embodiments, the connector retention mechanism **202** may include one or more retention arms **204**. The retention arms **204** may be configured to at least partially surround at least a portion of the optical interface. In this and other embodiments, each of the retention arms **204** may include a vertical portion **208**. Dimensions of the vertical portion **208** may be configured to accommodate a specific optical interface. For example, the retention arms **204** may be configured to at least partially surround the connector **300** discussed herein. Accordingly, the vertical portion **208** may be configured to substantially contact one or more side surfaces of the connector **300**.

In some embodiments, the retention arms **204** may omit, integrate, or extend the vertical portions **208** and/or the vertical portions **208** may include dimensions selected such that

the optical interface may be retained in the connector retention mechanism **202** by spring force or compression force. Additionally or alternatively, the retention arms **204** may include a horizontal portion that may be configured to extend at least partially between the retention arms **204**. The horizontal portion may be configured to support or be positioned adjacent to a portion of a bottom surface of the connector **300**.

The connector retention mechanism **202** may include a rear interface support **212**. The rear interface support **212** may be configured to support an optical interface retained therein. Additionally, in some embodiments, the connector retention mechanism **202** may be configured to apply a first retention force **244**A and/or a second retention force **244**B (FIGS. **2**A and **2**B only) (generally, retention force **244** or retention forces **244**) to the optical interface.

In the clip **200**, the rear interface support **212** may include one or more retention spring arms **260**. The retention spring arms **260** may be configured to apply one or more of the retention forces **244** to the optical interface in some circumstances. For example, in some configurations, the retention spring arms **260** may be configured to apply the retention forces **244** when an optical interface is retained in the connector retention mechanism **202**. Additionally or alternatively, the optical interface may apply a force to the rear interface support **212**. The force applied by the optical interface may include a direction in substantially the negative x-direction. The retention spring arms **260** may be configured to elastically flex, which may result in the retention force **244** counteracting the force applied by the optical interface. In these and other circumstances, the retention forces **244** may maintain the optical interface in a forward (e.g., having a larger x-coordinate) position with respect to the clip **200**, which may position to enable engagement with a lens assembly.

Additionally, in some embodiments one or more of the retention forces **244** may allow the optical interface to be "snap fit" into the connector retention mechanism **202**. For example, the retention spring arms **260** may be configured to apply the retention forces **244** having an adequate magnitude to retain the optical interface.

The retention spring arms **260** may include arced sections **262**, horizontal sections **268**, and vertical sections **264**. The arced sections **262** may include portions of the retention spring arms **260** that are configured to elastically flex in response to application of a force in the negative x-direction. The vertical sections **264** and the horizontal sections **268** may include portions of the retention spring arms **260** that are configured to contact the optical interface retained in the connector retention mechanism **202**. In circumstances in which the retention forces **244** are non-zero, the vertical sections **264** and the horizontal sections **268** of the retention spring arms **260** may transfer one or both of the retention forces **244** to the optical interface.

For example, with specific reference to FIG. **2**B, the retention spring arms **260** may extend from a clip body **226** (FIGS. **2**A and **2**B only). The arced section **262** may be arced in the negative x-direction. When a force is applied against the vertical section **264** in the negative x-direction, the arced section **262** may be flexed. In response, the first retention force **244**A may result in the positive x-direction.

With reference to FIG. **2**B, in some embodiments, the rear interface support **212** may define a connector height **266**. The connector height **266** may be defined between the horizontal sections **268** and an upper support section **254** (FIGS. **2**A and **2**B only). The connector height **266** may be sized to support a particular optical connector. Additionally, the connector height **266** may be sized such that introduction of the optical connector into the rear interface support **212** results in the second retention force **244**B, which may at least partially retain the optical connector.

One or more dimensions of the rear interface support **212** may be configured to passively support an optical interface. In these and other embodiments, the retention forces **244** may be substantially zero unless a force is applied to the rear interface support **212** and/or an optical interface is retained therein. When the force is applied or the optical interface retained in the rear interface support **212**, a magnitude of one or more of the retention forces **244** may become non-zero. Alternately or additionally, the retention forces **244** may vary in magnitude depending on a magnitude of a force in the opposite direction applied to the optical interface retained in the clip **200**. Thus, the rear interface support **212** may function as a stop to prevent motion of the optical interface in the negative x-direction beyond the rear interface support **212**.

The upper support section **254** (mentioned above) may extend from the clip body **226** and may separate into the retention spring arms **260**. The clip body **226** may be connected to a forward section **242** of the clip **200** at clip shoulders **216**. The clip shoulders **216** may include arcs of material between the clip body **226** and the forward section **242**. The arcs of material may allow for some deflection and/or flexure. The clip shoulders **216** may be configured such that the clip body **226** and the connector retention mechanism **202** may rotate substantially independent of the forward section **242** of the clip **200**. For example, when the clip **200** is actuated (discussed below), the connector retention mechanism **202** may not rotate about a z-axis as much as the forward section **242** or at all.

For example, with combined reference to FIGS. **1**B and **2**B, when the connector **300** is received in the lens assembly **400**, the connector and the connector retention mechanism **202** may be constrained. Thus, in these and other circumstances, the lens assembly **400** may substantially prevent rotation of the connector retention mechanism **202**.

Referring back to FIGS. **2**A-**2**C, the clip **200** may also include the release lever **220** and a lens latch **228**. The lens latch **228** may be configured to maintain the lens assembly engaged with the optical interface. The lens latch **228** may be positioned at a first end **230** of the forward section **242**. In this and other embodiments, the lens latch **228** may also include a rounded portion **240**. The rounded portion **240** may be configured to reduce interference as the optical interface retained in the connector retention mechanism **202** is introduced into the lens assembly.

The release lever **220** may be configured to unlatch the lens latch **228**, which may allow the optical interface to disengage from the lens assembly. The release lever **220** may be connected to the forward section **242** at a second end **252** of the release lever **220**. In some embodiments, the connection to the forward section **242** may be substantially rigid. As used with reference to the connection of the release lever **220** to the forward section **242**, the term "substantially rigid" may indicate that a force applied to a first end **232** (FIGS. **2**A and **2**B only) of the release lever **220** may be transferred to the forward section **242** via the connection. For instance, rather than only the release lever **220** moving in response to the force (e.g., **236** discussed below) on the first end **232**, the forward section **242** may also move.

With specific reference to FIG. **2**B, in this and other embodiments, a latching force **234** may act on the lens assembly in some circumstances. For example, in some embodiments, the clip **200** may be configured such that the latching force **234** may have a non-zero magnitude. For example, the clip **200** may include the clip shoulders **216**, which may

include the arcs of material between the clip body **226** and the forward section **242**. The arcs of material may result in the latching force **234** having a non-zero magnitude when the clip **200** is retaining an optical interface that is received in a lens assembly. Moreover, in these and other embodiments, one or more dimensions of the clip **200** may be configured such that when the optical interface is received within the lens assembly, the clip **200** may be stretched, which may result in the latching force **234**.

In some embodiments, one or more dimensions of the clip **200** may be configured such that a magnitude of the latching force **234** may be substantially zero unless a force is applied to the clip **200** or another component that attempts to remove the optical interface from the lens assembly. In these embodiments, when the force is applied, the magnitude of the latching force **234** may become non-zero. The latching force **234** is described below in circumstances in which the latching force **234** is non-zero.

When the latching force **234** has a non-zero magnitude, the lens assembly may press against the optical interface retained in the connector retention mechanism **202**. Accordingly, the lens latch **228** may function as a stop to prevent motion of the lens assembly in the positive x-direction beyond the lens latch **228**. The latching force **234** combined with the retention force **244** may maintain the lens assembly and the optical interface in an engaged configuration.

To activate the release lever **220**, which may unlatch the lens latch **228** from the lens assembly, the actuation force **236** may be applied to the release lever **220**. The actuation force **236** may result in the first end **232** of the release lever **220** being displaced in the negative y-direction. As a result, the second end **252** of the release lever **220**, and thus the lens latch **228**, may be displaced in the positive y-direction, in a manner described in more detail to follow. Displacement of the lens latch **228** in the positive y-direction is represented in FIG. **2**B by arrow **238**. Specifically, in the depicted clip **200**, the forward section **242** of the clip **200** including the lens latch **228** may be displaced in the positive y-direction so as to disengage the lens latch **228** from the lens assembly.

For example, the forward section **242** of the clip **200** may rotate clockwise (according to the orientation of FIG. **2**B) about the clip shoulders **216**. When the lens latch **228** is displaced a predefined distance (e.g., a height of the lens latch **228**) in the positive y-direction, the latching force **234** may no longer act on the lens assembly and/or the lens latch **228** is displaced sufficiently to no longer interfere with the lens assembly. When the latching force **234** no longer acts on the lens assembly and/or the lens latch **228** is displaced sufficiently to no longer interfere with the lens assembly, the clip **200** and the optical interface retained in the connector retention mechanism **202** may be disengaged from the lens assembly.

In some embodiments, the release lever **220** may include a preload force **256**. The preload force **256** may generally return the release lever **220** to an angular position with respect to the clip body **226**, such as the angular position illustrated in FIG. **2**B. For example, after the actuation force **236** is removed from the release lever **220**, the preload force **256** may return the release lever **220** to the angular position with respect to the clip body **226** illustrated in FIG. **2**B. The preload force **256** may vary in magnitude. For instance, the preload force **256** may have substantially zero magnitude when the clip **200** is out in the open (e.g., as shown in FIGS. **1**C and **1**D). Additionally, the preload force **256** may have some non-zero magnitude when the release lever **220** is displaced downward after insertion into an optoelectronic module.

Referring to FIGS. **2**A-**2**C, the release lever **220** may also include a secondary latch **258**. The secondary latch **258** may be configured to engage a secondary latch opening defined in a module housing. For example, with combined reference to FIGS. **1**B and **2**A-**2**C, a secondary latch opening **120** may be defined in the module housing **140**. The secondary latch **258** may be configured to engage the secondary latch opening **120** when the clip **200** is positioned within the module housing **140**. When the actuation force **236** is applied to the release lever **220**, a resulting displacement in the negative y-direction of the first end **232** of the release lever **220** may disengage the secondary latch **258** from the latch opening **120** defined in the module housing **140** and may displace the forward section **242** in the positive y-direction as already described. When the lens latch **228** is displaced a predefined distance in the positive y-direction and the secondary latch **258** is disengaged from the latch opening **120**, the connector **300** may be disengaged from the lens assembly **400** and may be withdrawn from the module housing **140**.

Additionally, with combined reference to FIGS. **1**B and **2**B, the dimensions of the clip **200** may be determined in relation to the module housing **140**. For example, the release lever **220** may be sized to protrude from the module housing **140**, Specifically, the release lever **220** may include a length **250** defined between the second end **252** of the release lever **220** and the first end **232** of the release lever **220**. The length **250** may be determined such that a portion of the release lever **220** protrudes from the module housing **140**. In some embodiments, the release lever **220** may be fitted with a handle.

Referring back to FIGS. **2**A-**2**C, in some embodiments, the clip **200** may include lens-stabilizing arms **270**. The lens-stabilizing arms **270** may extend in substantially the positive x-direction. The lens-stabilizing arms **270** may be configured to contact sides of a lens assembly to reduce motion in the positive and negative z-directions. More generally, the lens-stabilizing arms **270** may confine the lens assembly in the z-direction between the lens-stabilizing arms **270**.

Referring to FIG. **2**C, the clip **200** may be configured to correspond to a particular optical interface and/or a particular lens assembly. For example, the retention spring arms **260** may be separated by a first distance **274**. The first distance **274** may correspond to a width of a particular MT connector, for instance. The first distance **274** may allow the particular connector to be positioned between the retention spring arms **260** and/or such that the retention spring arms **260** contact or have a specified clearance from one or more surfaces of the particular optical interface.

Additionally, the clip **200** may be configured to correspond to a particular lens assembly. For example, the lens-stabilizing arms **270** and/or dimples **282** included thereon, may be separated by a second length **272**. The second length **272** may be determined such that the lens-stabilizing arms **270** contact one or more surfaces of the particular lens assembly, or at least such that the lens-stabilizing arms **270** confine the lens assembly therebetween in the z-direction. In some embodiments including the dimples **282**, the second length **272** may be determined the such that the dimples **282** may be received in a cavity or recess on the particular lens assembly. When received in the cavity or recess on the particular lens assembly, the dimples **282** may contribute a force that may act in the z-direction and/or the x-direction to maintain engagement between an optical interface and the particular lens assembly.

With continued reference to FIG. **2**C, the lens latch **228** may have a lens latch length **278**. The lens latch length **278** may be greater than the second length **272** and/or greater than a width of the lens assembly. The lens latch length **278** may

reduce collisions between the lens latch **228** and a lens assembly opening configured to receive the optical interface.

Additionally, the rear interface support **212** may include a rear support length **276**. The rear support length **276** may provide a structure to which a dust seal such as the dust seal **122** of FIGS. **1**A-**1**D may attach. Some additional details of the structure to which the dust seal attaches are provided below with reference to FIGS. **5**A and **5**B.

FIGS. **3**A and **3**B illustrate the clip **200** of FIGS. **2**A-**2**C retaining an example of the connector **300** discussed with reference to FIGS. **1**A-**1**D. The connector **300** is one example of an optical interface as that term is used herein. The connector **300** in the depicted embodiment is a pluggable MT connector. In some embodiments, the clip **200** may be configured to retain other types of optical interfaces. FIG. **3**A depicts a side view of the clip **200** retaining the connector **300** and FIG. **3**B depicts a perspective view of the clip **200** retaining the connector **300**.

As mentioned above, the clip **200** may be configured to retain the connector **300** and to maintain the connector **300** in a forward position (e.g., having a greater x-dimension) with respect to the clip **200**. In the forward position, an insertable portion **302** of the connector **300** may be forward of the retention arms **204**. The insertable portion **302** may include the portion of the connector **300** that is configured to be received, introduced into, or positioned with respect to a lens assembly (not shown in FIGS. **3**A and **3**B).

Additionally, the connector **300** may also include a supported portion **308** (FIG. **3**B only). The supported portion **308** may include the portion of the connector **300** that may be contacted by the retention arms **204** or more generally may include the portion of the connector **300** substantially enclosed, enveloped, or surrounded by the retention arms **204**. In this and other embodiments, the retention arms **204** may contact and/or be positioned adjacent to the supported portion **308** along portions of two sides of the connector **300**. In some embodiments, the retention arms **204** may contact and/or be positioned adjacent to one or more entire sides of the supported portion **308**, an entire bottom of the connector **300**, the retention arms **204** may not contact one or more of the sides or the bottom, etc.

The connector **300** may also include a rear portion **304**. When retained in the connector retention mechanism **202**, the rear portion **304** may be positioned in the rear interface support **212**. As best depicted in FIG. **3**B, in this and other embodiments, the rear portion **304** may extend past (e.g., has higher and/or lower z-coordinate) the retention arms **204**. The retention spring arms **260** may apply the first retention force **244**A to a rear surface **318** of the rear portion **304**, which may press a front surface **320** of the rear portion **304** against the retention arms **204**. By pressing the front surface **320** of the rear portion **304** against the retention arms **204**, the insertable portion **302** may be maintained forward of the retention arms **204** and the connector **300** may be retained in the connector retention mechanism **202**.

The connector retention mechanism **202** may also secure the connector **300** in the y-direction. Specifically, the rear portion **304** may be supported by and/or held between the upper support section **254** and the horizontal sections **268**. Additionally or alternatively, the supported portion **308** may be supported by and/or held between the horizontal sections **268** of the retention arms **204** and the clip body **226**. Movement of the connector **300** with respect to the clip **200** may accordingly be limited. In some embodiments, by securing the connector **300**, a vertical clearance **314** (FIG. **3**A only). The vertical clearance **314** may enable reception of the insertable portion **302** into a lens assembly without the first clip **200**A physically interfering.

The connector **300** may also include a cable support portion **306**. The cable support portion **306** generally includes a portion of the connector **300** that supports one or more optical cables (e.g., the optical cables **102** of FIGS. **1**A-**1**D). For example, one or more optical cables may be received into or otherwise coupled to the cable support portion **306**. With combined reference to FIGS. **2**C and **3**B, the first distance **274** may be sized to accommodate the cable support portion **306** of the connector **300**.

FIGS. **4**A and **4**B illustrate the clip **200** of FIGS. **2**A-**2**C retaining the connector **300** engaged with an example of the lens assembly **400**. The clip **200** may be configured to maintain the connector **300** engaged with the lens assembly **400** and to maintain an alignment between the connector **300** and the lens assembly **400**. Additionally, the clip **200** may be configured to be unlatched through application of the actuation force **236**, enabling disengagement of the connector **300** from the lens assembly **400**. FIG. **4**A depicts a perspective view of the clip **200** retaining the connector **300** engaged with the lens assembly **400** and FIG. **4**B depicts a side view of the clip **200** retaining the connector **300** engaged with the lens assembly **400**.

The lens latch **228** may be configured to apply the latching force **234** against a front surface **404** of the lens assembly **400**. More generally, the lens latch **228** may be configured to engage the front surface **404** of the lens assembly **400** and thereby prevent movement of the clip **200** and the connector **300** in the negative x-direction relative to the lens assembly **400**. The latching force **234** may be oriented in substantially the negative x-direction while the first retention force **244**A may be oriented in substantially the positive x-direction. The first retention force **244**A and/or the latching force **234** may thus maintain engagement between the connector **300** and the lens assembly **400**.

In this and other embodiments, the lens latch **228** may be configured to apply the latching force **234** along a length **406** of the front surface **404**. Accordingly, the latching force **234** may be transferred about evenly along the length **406**. Thus, the lens latch **228** may also maintain an alignment between the lens assembly **400** and the connector **300**.

When the release lever **220** is activated by the actuation force **236**, the connector retention mechanism **202** may be held relatively fixed. The forward section **242** may rotate clockwise about the clip shoulders **216**, which may displace the lens latch **228** in substantially the positive y-direction such that the latching force **234** disengages from the front surface **404**. The displacement substantially in the positive y-direction of the lens latch **228** is represented in FIGS. **4**A and **4**B by the arrow **238**. The connector **300** may then be disengaged from the lens assembly **400** by moving the connector **300** and the clip **200** in substantially the negative x-direction.

With reference to FIG. **4**B, the clip **200** may be configured to produce a secure engagement between the lens assembly **400** and the connector **300**. For example, the lens assembly **400** may have a lens depth **402**. The clip **200** may accordingly include a length **280** that enables the connector **300** to be engaged with the lens assembly **400** with the lens latch **228** applying the latching force **234** against the front surface **404**.

Referring back to FIGS. **4**A and **4**B, when the connector **300** is engaged with the lens assembly **400**, the lens-stabilizing arms **270** may contact side surfaces **414** of the lens assembly **400**, or more confine the lens assembly **400** therebetween. Only one of the side surfaces **414** and only one of the lens-

stabilizing arms **270** is visible in FIGS. **4**A and **4**B. Contact between the lens-stabilizing arms **270** and the side surfaces **414** may reduce motion of the lens assembly **400** with respect to the connector **300** in substantially the z-direction.

Additionally, in the embodiment depicted in FIGS. **4**A and **4**B, dimples **282** may be configured to be received in cavities or recesses included on the lens assembly **414**. When the dimples **282** are received in the cavities or recesses, a force that may help maintain engagement between the connector **300** and the lens assembly **400** may be created.

In these and other embodiments, unlatching of the lens assembly **400** may be prevented unless the actuation force **236** includes a force having a magnitude of a particular threshold. The particular threshold may be determined at least in part by material selection (e.g., rigidity, flexibility, etc.) of the clip **200**, dimensions of the clip shoulder (**216** in FIGS. **2**A-**2**C) and the like.

Additionally, in this and other embodiments, the lens latch **228** may include the rounded portion **240**. The rounded portion **240** may reduce interference when the connector **300** retained in the connector retention mechanism **202** is introduced into the lens assembly **400**. Specifically, as the connector **300** is moved in the positive x-direction, the rounded portion **240** may slide along the top surface **412** of the lens assembly **400**. When the connector **300** is moved such that the lens latch **228** is forward (e.g., having a greater positive x-coordinate) of the front surface **404**, the lens latch **228** may move or spring in the negative y-direction, which may latch the lens assembly **400** to the connector **300**.

FIGS. **5**A and **5**B illustrate the clip **200** with an example embodiment of the dust seal **122**. FIG. **5**A depicts the clip **200** attached to the dust seal **122** and FIG. **5**B depicts the clip **200** exploded from the dust seal **122**. The dust seal **122** in FIGS. **5**A and **5**B includes an attachment structure **502**. The attachment structure **502** may be configured to attach the clip **200** to the dust seal **122**. The attachment structure **502** may define cutaway portions **504**. The cutaway portions **504** may correspond to the rear interface support **212**. In particular, the cutaway portion **504** may include a shape that is similar to the retention spring arms **260**.

Additionally, the cutaway portions **504** may include attachment slots **506**. The attachment slots **506** may be configured to receive a portion of the upper support section **254**. With combined reference to FIGS. **2**C, **5**A, and **5**B, the rear support length **276** may be sized such that the upper support section **254** includes material that may be received by the attachment slots **506**.

FIGS. **6**A and **6**B illustrate an example multiple module implementation **600**. FIG. **6**A depicts a perspective view of the multiple module implementation **600** and FIG. **6**B depicts a side, sectional view of a portion of the multiple module implementation **600**. The multiple module implementation **600** includes multiple examples of the optoelectronic module **100** of FIGS. **1**A-**1**D, which may be mounted to a common board **602**.

Referring to FIG. **6**A, the multiple module implementation **600** generally depicts an example cable management system that may be implemented in environments in which multiple optoelectronic modules **100** (one of which is labeled in FIG. **6**A) are utilized in close proximity to one another. The optoelectronic modules **100** may be arranged in rows **604**A-**604**C (generally, row **604** or rows **604**) and columns **606**A-**606**F (generally, column **606** or columns **606**). In FIGS. **6**A and **6**B, the terms "upstream" and "downstream" are meant to indicate relationships between the optoelectronic modules **100** and their positions in the columns **606** and the rows **604**. Specifically, the optoelectronic module **100** in a first column **606**A of a first row **604**A is referred to as being upstream of another optoelectronic module **100** in a second column **606**B of the first row **604**A. Likewise, the optoelectronic module **100** in the second column **606**B of the first row **604**A is downstream of the optoelectronic module **100** in the first column **606**A of the first row **604**A.

The optoelectronic modules **100** in each row **604** may be oriented similarly. For example, in each of the rows **604**, the optoelectronic modules **100** may be oriented such that the optical cables **102** (only one of which is labeled in FIG. **6**A) extend from the optoelectronic modules **100** on a same side. For example, in FIG. **6**A, two sides of the optoelectronic modules **100** may be defined as substantially parallel to the yz-plane and two sides of the optoelectronic modules **100** may be defined as substantially parallel to the xy-plane. The optoelectronic modules **100** may be oriented such that the optical cables **102** exit from a first side oriented substantially parallel to the yz-plane and having a lower x-coordinate that a second side oriented substantially parallel to the yz-plane.

With this orientation, the optical cable **102** exiting each of the optoelectronic modules **100** faces the sloped sections **146** (only one of which is labeled in FIG. **6**A) of the adjacent, downstream optoelectronic module **100**. Additionally, the cable paths **144** (only one of which is labeled in FIG. **6**A) of each of the optoelectronic modules **100** in each of the rows **604** may be substantially aligned.

To manage the optical cables **102**, each of the optical cables **102** may be positioned within the cable paths **144** of each downstream optoelectronic module **100**. Additionally or alternatively, the optical cables **102** may be stacked in the cable paths **144**. For example, in some embodiments one or more of the upstream optical cables **102** may be stacked on top of the optical cables **102** of one or more of the downstream optoelectronic modules **100**.

For example, FIG. **6**B depicts the first row **604**A of FIG. **6**A. In FIG. **6**B, the optoelectronic modules **100** are individually labeled as optoelectronic modules **100**A-**100**F. A first optoelectronic module **100**A is upstream of a second optoelectronic module **100**B, which is upstream of a third optoelectronic module **100**C, etc. Each of the optoelectronic modules **100**A-**100**F may include cable paths **144**A-**144**F and sloped sections **146**A-**146**F. Additionally, optical cables **102**A-**102**F (generally, optical cable **102** or optical cables **102**) exit each of the optoelectronic modules **100**A-**100**F.

A first optical cable **102**A may exit the first optoelectronic module **100**A. The first optical cable **102**A may then contact a portion of a second sloped section **146**B of the second optoelectronic module **100**B. The first optical cable **102**A may be positioned in a second cable path **144**B of the second optoelectronic module **100**B. The second sloped section **146**B may be configured (e.g., include the angle **150** of FIG. **1**B) such that a bend imparted to the first optical cable **102**A does not exceed a maximum acceptable bend radius.

A second optical cable **102**B may exit the second optoelectronic module **100**B. The second optical cable **102**B may then contact a portion of a third sloped section **146**C of the third optoelectronic module **100**C. The first optical cable **102**A and the second optical cable **102**B may be positioned in a third cable path **144**C of the third optoelectronic module **100**C. The first optical cable **102**A may be stacked on top of the second optical cable **102**B in the third cable path **144**C. The third sloped section **146**C may be configured (e.g., including the angle **150** of FIG. **1**B) such that a bend imparted to the second optical cable **102**B does not exceed a maximum acceptable bend radius. Similarly, a third optical cable **102**C, a fourth optical cable **102**D, and a fifth optical cable **102**E may be positioned in the cable paths **144**D-**144**F along with the first

optical cable **102**A and the second optical cable **102**B. Additionally, each of the optical cables **102**A-**102**E may be supported by sloped sections **146**D-**146**F immediately downstream the optoelectronic modules **100**D-**100**F. Additionally, once positioned in the cable paths **144**, movement of the optical cables **102** may be limited in the z-direction.

The present invention may be embodied in other specific forms. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A cable clip configured to maintain engagement of an optical interface with a lens assembly included in an optoelectronic module, the cable clip comprising:

a clip shoulder;

a clip body;

a forward section that is attached to the clip body at the clip shoulder and that includes a first end opposite the clip shoulder, the forward section extending substantially in a first direction from the clip body such that the forward section extends along at least a portion of a top, external surface of the lens assembly when a portion of optical interface is received in the lens assembly;

a connector retention mechanism that is configured to retain the optical interface, wherein the connector retention mechanism extends from the clip body;

a lens latch positioned at the first end, wherein the lens latch is configured to apply a latching force to a front, external surface of the lens assembly to latch the lens assembly against the optical interface when the portion of the optical interface is received within the lens assembly; and

a release lever that is connected to the forward section, wherein the release lever is configured to unlatch the lens latch from the lens assembly in response to application of an actuation force in a second direction that flexes the forward section relative to the connector retention mechanism and displaces the lens latch relative to the lens assembly in a third direction, which is substantially opposite the second direction.

2. The cable clip of claim **1**, wherein the connector retention mechanism includes:

a retention arm that is configured to at least partially surround the optical interface; and

a rear interface support that is configured to support the optical interface.

3. The cable clip of claim **1**, wherein the release lever includes a secondary latch configured to engage a secondary latch opening defined in a module housing of the optoelectronic module.

4. The cable clip of claim **3**, wherein the secondary latch is configured to disengage from the secondary latch opening in response to the application of the actuation force.

5. The cable clip of claim **1**, wherein the release lever includes a length defined such that a portion of the release lever protrudes from a module housing of the optoelectronic module.

6. The cable clip of claim **1**, wherein the connector retention mechanism includes a rear interface support, wherein the rear interface support is configured to apply a retention force on the optical interface retained in the connector retention mechanism.

7. The cable clip of claim **1**, wherein the lens latch includes a rounded portion configured to reduce interference between the cable clip and the lens assembly while the optical interface is introduced into the lens assembly.

8. A connector assembly configured to be at least partially positioned within a module housing of an optoelectronic module, the connector assembly comprising:

a cable clip that is configured to maintain engagement between an optical interface and a lens assembly when the cable clip is latched and to allow disengagement of the connector from the lens assembly when the cable clip is unlatched, wherein the cable clip includes:

a clip shoulder;

a clip body;

a forward section that is attached to the clip body at the clip shoulder and that includes a first end opposite the clip shoulder, the forward section extending substantially in a first direction from the clip body such that the forward section extends along at least a portion of a top, external surface of the lens assembly when a portion of optical interface is received in the lens assembly;

a connector retention mechanism that extends from the clip body and is configured to retain the optical interface;

a lens latch positioned by the first end, wherein the lens latch is configured to apply a latching force to a front, external surface of the lens assembly to latch the lens assembly against the optical interface when the portion of the optical interface is received within the lens assembly;

a release lever that is connected to the forward section and is sized in relation to the module housing such that when the optical interface is received in the lens assembly, a portion of the release lever protrudes from the module housing, wherein the release lever is configured to unlatch the cable clip in response to application of an actuation force to the portion of the release lever that protrudes from the module housing in a second direction that flexes the forward section relative to connector retention mechanism and displaces the lens latch relative to the lens assembly in a third direction, which is substantially opposite the second direction; and

a dust seal that is configured to at least partially surround the connector and the cable clip, wherein the dust seal is sized to substantially fill a space between the connector and a module opening through which the connector assembly is introduced into the module housing.

9. The connector assembly of claim **8**, wherein the cable clip includes a connector retention mechanism configured to retain the connector with respect to the cable clip.

10. The connector assembly of claim **9**, wherein the connector retention mechanism includes a rear interface support configured to apply a retention force against a rear surface of the connector.

11. The connector assembly of claim **10**, wherein the cable clip includes a rear interface support configured to elastically flex and apply the retention force.

12. The connector assembly of claim **8**, wherein the cable clip includes a lens latch positioned at a first end of a forward section, the lens latch configured to contact a front surface of the lens assembly when the connector is received in the lens assembly.

13. The connector assembly of claim **12**, wherein the release lever is configured to disengage from the lens assembly in response to application of the actuation force.

14. The connector assembly of claim 13, wherein:
the release lever includes a secondary latch that is configured to engage a secondary latch opening defined in the module housing;
the release lever is configured to disengage from the secondary latch opening in response to the actuation force; and
the cable clip includes lens-stabilizing arms that extend from the connector retention mechanism, wherein the lens-stabilizing arms are configured to confine the lens assembly therebetween.

15. The connector assembly of claim 8, wherein the dust seal includes an attachment structure that is configured to attach the cable clip to the dust seal.

16. A cable clip that is configured to maintain engagement between a mechanical transfer (MT) connector having twenty-four optical channels configured to communicate twenty-four channels of data and a lens assembly included in an optoelectronic module configured to communicate data at 25 gigabits per second (G) or higher, the cable clip comprising:
clip shoulders;
a clip body;
a connector retention mechanism configured to retain the MT connector, wherein the connector retention mechanism extends from the clip body;
a forward section attached to the clip body at the clip shoulders and that includes a first end opposite the clip shoulders, the forward section extending substantially in a first direction from the clip body such that the forward section extends along at least a portion of a top, external surface of the lens assembly when a portion of MT connector is received in the lens assembly;
a lens latch positioned at the first end of the forward section, the lens latch configured to apply a latching force to a front, external surface of the lens assembly when a portion of the MT connector is received within the lens assembly; and
a release lever that extends from the forward section and is sized to partially protrude from a module housing, wherein in response to application of an actuation force to the release lever in a second direction, the release lever is configured to flex the forward section relative to the connector retention mechanism and displace the lens latch relative to the lens assembly in a third direction, which is substantially opposite the second direction.

17. The cable clip of claim 16, wherein the connector retention mechanism includes:
retention arms configured to at least partially surround a supported portion of the MT connector and not surround an insertable portion of the MT connector;
retention spring arms configured to apply a first retention force to a rear surface of the MT connector to maintain the MT connector in a forward position with respect to the cable clip; and
an upper support section and a horizontal support sections configured to support a rear portion of the MT connector therebetween.

18. The cable clip of claim 17, further comprising lens-stabilizing arms that extend from the connector retention mechanism, wherein the lens-stabilizing arms are configured to confine the lens assembly therebetween.

19. The cable clip of claim 17, wherein the release lever includes a secondary latch that is configured to engage a secondary latch opening defined in a module housing of the optoelectronic module, wherein the secondary latch is further configured to disengage from the secondary latch opening in response to the application of the actuation force.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 9,134,492 B2
APPLICATION NO.	: 14/264815
DATED	: September 15, 2015
INVENTOR(S)	: Hsieh

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the specification

Column 13, Line 7, delete "assembly 414." and insert -- assembly 400. --, therefor.

Signed and Sealed this
Twenty-first Day of June, 2016

Michelle K. Lee

Michelle K. Lee
Director of the United States Patent and Trademark Office